IN THE CLAIMS:

This listing will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method of depositing a metal layer on a substrate, the method comprising:

providing a substrate in a process chamber; and

performing a plurality of deposition cycles to deposit a metal layer with a desired total thickness, each deposition cycle comprising:

first, exposing the substrate to a metal-carbonyl precursor gas to deposit a thickness between greater than 5 angstrom (A) and about 60 angstrom (A) of the metal layer on the substrate, wherein the substrate is maintained at a substrate temperature that results in thermal decomposition of the metal-carbonyl precursor gas, and

second, exposing the metal layer to a reducing gas.

2. (Original) The method according to claim 1, wherein the metal-carbonyl precursor comprises at least one of $W(CO)_6$, $Ni(CO)_4$, $Mo(CO)_6$, $Co_2(CO)_8$, $Rh_4(CO)_{12}$, $Re_2(CO)_{10}$, $Cr(CO)_6$, and $Ru_3(CO)_{12}$.

3. (Original) The method according to claim 1, wherein the metal layer comprises at least one of W, Ni, Mo, Co, Rh, Re, Cr, and Ru.

4. (Original) The method according to claim 1, wherein a flow rate of the metal-carbonyl precursor is less than about 4 sccm.

5. (Original) The method according to claim 1, wherein the metal-carbonyl precursor gas further comprises at least one of a dilution gas and a carrier gas.

6. (Previously Presented) The method according to claim 5, wherein the at least one of a dilution gas and a carrier gas comprises an inert gas comprising at least one of Ar, He, Kr, Xe, and N_2.

7. (Canceled)

8. (Original) The method according to claim 5, wherein the precursor gas includes a carrier gas having a flow rate between about 50 sccm and about 500 sccm.

9. (Original) The method according to claim 8, wherein a flow rate of the carrier gas is between about 50 sccm and about 200 sccm.

10. (Currently Amended) The method according to claim 5, wherein [[a]] the precursor gas includes a dilution gas having a flow rate between about 50 sccm and about 1000 sccm.

11. (Original) The method according to claim 10, wherein a flow rate of the dilution gas is between about 50 sccm and about 500 sccm.

12. (Original) The method according to claim 1, wherein the metal-carbonyl precursor flow is between about 1 sec and about 500 sec.

13. (Original) The method according to claim 1, wherein the reducing gas comprises at least one of a silicon-containing gas, a boron-containing gas, and a nitrogen-containing gas.

14. (Original) The method according to claim 13, wherein reducing gas comprises at least one of SiH_4, Si_2H_6, and $SiCl_2H_2$.

15. (Original) The method according to claim 13, wherein the reducing gas comprises at least one of BH_3, B_2H_6, and B_3H_9.

16. (Original) The method according to claim 13, wherein the reducing gas comprises NH_3.

17. (Original) The method according to claim 1, wherein a flow rate of the reducing gas is less than about 500 sccm.

18. (Original) The method according to claim 1, wherein the reducing gas flow is between about 1 sec and about 120 sec.

19. (Original) The method according to claim 1, wherein the reducing gas further comprises a dilution gas.

20. (Previously Presented) The method according to claim 19, wherein the dilution gas comprises an inert gas comprising at least one of Ar, He, Kr, Xe, and N_2.

21. (Canceled)

22. (Original) The method according to claim 19, wherein a flow rate of the dilution gas is between about 50 sccm and about 2000 sccm.

23. (Canceled)

24. (Original) The method according to claim 1, wherein the metal-carbonyl precursor gas and the reducing gas are sequentially flowed into the process chamber.

25. (Original) The method according to claim 1, further comprising flowing a purge gas in the process chamber.

26. (Previously Presented) The method according to claim 25, wherein the purge gas comprises an inert gas. comprising at least one of Ar, He, Kr, Xe, and N_2

27. (Canceled)

28. (Original) The method according to claim 25, wherein the purge gas is continuously flowed in the process chamber.

29. (Original) The method according to claim 25, wherein the purge gas is flowed in the process chamber prior to at least one of said exposing of said substrate and said exposing of said metal layer.

30. (Original) The method according to claim 29, wherein the purge gas is flowed for less than about 120 sec prior to at least one of said exposing of said substrate and said exposing of said metal layer.

31. (Original) The method according to claim 25, wherein a flow rate of the purge gas is between about 100 sccm and 1000 sccm.

32. (Original) The method according to claim 1, wherein the substrate temperature is between about 200° C and about 600° C.

33. (Original) The method according to claim 1, wherein a process chamber pressure is less than about 5 Torr.

34. (Canceled)

35. (Currently Amended) The method according to claim 1 ~~34~~, wherein the thickness of the metal layer deposited in one deposition cycle is between about 15 A and about 30 A.

36. (Original) The method according to claim 1, wherein the substrate comprises at least one of a semiconductor substrate, a LCD substrate, and a glass substrate.

37. (Previously Presented) The method according to claim 36, wherein the semiconductor substrate comprises at least one of Si, SiO_2, Ta, TaN, Ti, TiN, and a high-k material.

38. (Currently Amended) A method of depositing a W layer on a substrate, the method comprising:

providing a substrate in a process chamber; and

performing a plurality of deposition cycles to deposit a W layer with a desired total thickness, each deposition cycle comprising:

first, exposing the substrate to a $W(CO)_6$ precursor gas to deposit a thickness between greater than 5 angstrom (A) and about 60 angstrom (A) of the W layer on the substrate, wherein the substrate is maintained at a substrate temperature that results in thermal decomposition of the $W(CO)_6$ precursor gas, and

second, exposing the W layer to a reducing gas.

39. (Original) The method according to claim 38, wherein a flow rate of the $W(CO)_6$ precursor is less than about 4 sccm.

40. (Original) The method according to claim 38, wherein the $W(CO)_6$ precursor gas further comprises at least one of a dilution gas and a carrier gas.

41. (Previously Presented) The method according to claim 40, wherein the at least one of a dilution gas and a carrier gas comprises an inert gas comprising at least one of Ar, He, Kr, Xe, and N_2.

42. (Canceled)

43. (Original) The method according to claim 41, wherein the precursor gas includes the carrier gas having a flow rate between about 50 sccm and about 500 sccm.

44. (Original) The method according to claim 43, wherein a flow rate of the carrier gas is between about 50 sccm and about 200 sccm.

45. (Original) The method according to claim 41, wherein the precursor gas includes the dilution gas having a flow rate between about 50 sccm and about 1000 sccm.

46. (Original) The method according to claim 45, wherein a flow rate of the dilution gas is between about 50 sccm and about 500 sccm.

47. (Original) The method according to claim 38, wherein the $W(CO)_6$ precursor flow is between about 1 sec and about 500 sec.

48. (Original) The method according to claim 38, wherein the reducing gas comprises at least one of a silicon-containing gas, a boron-containing gas, and a nitrogen-containing gas.

49. (Original) The method according to claim 48, wherein the reducing gas comprises at least one of SiH_4, Si_2H_6, and $SiCl_2H_2$.

50. (Original) The method according to claim 48, wherein the reducing gas comprises at least one of BH_3, B_2H_6, and B_3H_9.

51. (Original) The method according to claim 48, wherein the reducing gas comprises NH_3.

52. (Original) The method according to claim 38, wherein a flow rate of the reducing gas is less than about 500 sccm.

53. (Original) The method according to claim 38, wherein the reducing gas flow is between about 1 sec and about 120 sec.

54. (Original) The method according to claim 38, wherein the reducing gas further comprises a dilution gas.

55. (Previously Presented) The method according to claim 54, wherein the dilution gas comprises an inert gas comprises at least one of Ar, He, Kr, Xe, and N_2.

56. (Canceled)

57. (Original) The method according to claim 54, wherein a flow rate of the dilution gas is between about 50 sccm and about 2000 sccm.

58. (Canceled)

59. (Original) The method according to claim 38, wherein the $W(CO)_6$ precursor and the reducing gas are sequentially flowed into the process chamber.

60. (Original) The method according to claim 38, further comprising flowing a purge gas in the process chamber.

61. (Previously Presented) The method according to claim 60, wherein the purge gas comprises an inert gas comprising at least one of Ar, He, Kr, Xe, and N_2.

62. (Canceled)

63. (Original) The method according to claim 60, wherein the purge gas is continuously flowed in the process chamber.

64. (Original) The method according to claim 60, wherein the purge gas is flowed in the process chamber prior to at least one said exposing of said substrate and said exposing of said W layer.

65. (Original) The method according to claim 64, wherein the purge gas is flowed for less than about 120 sec prior to at least one of said exposing of said substrate and said exposing of said W layer.

66. (Original) The method according to claim 60, wherein a flow rate of the purge gas is between about 100 sccm and about 1000 sccm.

67. (Original) The method according to claim 38, wherein the substrate temperature is between about 200° C and about 600° C.

68. (Original) The method according to claim 67, wherein the substrate temperature is about 410° C.

69. (Original) The method according to claim 38, wherein a process chamber pressure is less than about 5 Torr.

70. (Original) The method according to claim 69, wherein a process chamber pressure is about 0.2 Torr.

71. (Canceled)

72. (Currently Amended) The method according to claim 38~~71~~, wherein the thickness of the W layer deposited in one deposition cycle is between about 15A and about 30A.

73. (Original) The method according to claim 38, wherein the substrate comprises at least one of a semiconductor substrate, a LCD substrate, and a glass substrate.

74. (Previously Presented) The method according to claim 73, wherein the semiconductor substrate comprises at least one of Si, SiO_2, Ta, TaN, Ti, TiN, and a high-k material.

75. (Currently Amended) The method according to claim 1 ~~34~~, wherein the thickness of the metal layer deposited in one deposition cycle is about 12 A.

76. (Currently Amended) The method according to claim 1 ~~34~~, wherein the thickness of the metal layer deposited in one deposition cycle is about 30 A.

77. (Currently Amended) The method according to claim 1 ~~34~~, wherein the thickness of the metal layer deposited in one deposition cycle is about 40 A.

78. (Currently Amended) The method according to claim 1 ~~34~~, wherein the thickness of the metal layer deposited in one deposition cycle is about 45 A.

79. (Currently Amended) The method according to claim 38 ~~71~~, wherein the thickness of the W layer deposited in one deposition cycle is about 12 A.

80. (Currently Amended) The method according to claim 38 ~~71~~, wherein the thickness of the W layer deposited in one deposition cycle is about 30 A.

81. (Currently Amended) The method according to claim 38 ~~71~~, wherein the thickness of the W layer deposited in one deposition cycle is about 40 A.

82. (Currently Amended) The method according to claim 38 ~~71~~, wherein the thickness of the W layer deposited in one deposition cycle is about 45 A.